Notice of Allowability	Application No.	Applicant(s)	
	09/881,407	WANG, ZHONGZE	
	Examiner	Art Unit	
	Pamela E. Perkins	2822	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to *the after-fianl amendment filed on 19 May 2005*.

2. ☒ The allowed claim(s) is/are *1-5 and 26-35*.

3. ☒ The drawings filed on *13 June 2001* are accepted by the Examiner.

4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
   a) ☐ All b) ☐ Some* c) ☐ None of the:
      1. ☐ Certified copies of the priority documents have been received.
      2. ☐ Certified copies of the priority documents have been received in Application No. _____ .
      3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

   * Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.

6. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
   (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
      1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
   (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.

Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).

7. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☐ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
3. ☐ Information Disclosure Statements (PTO-1449 or PTO/SB/08), Paper No./Mail Date _____
4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
5. ☐ Notice of Informal Patent Application (PTO-152)
6. ☐ Interview Summary (PTO-413), Paper No./Mail Date _____.
7. ☐ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____.

AMIR ZARABIAN
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800

DETAILED ACTION

This office action is in response to the filing of the after-final amendment on 19 May 2005. Claims 1-5 and 26-35 are pending; claims 61-67 have been cancelled.

Allowable Subject Matter

Claims 1-5 and 26-35 are allowed.

Reasons for Allowance

The following is an examiner's statement of reasons for allowance: prior art does not anticipate, teach, or suggest a method of forming a transistor device where a silicon-comprising surface is exposed to activated nitrogen to increase a peak nitrogen concentration within the silicon-comprising surface by at least 15% (atom percent), the exposing forming a material comprising silicon and nitrogen; providing a channel region on one side of the material comprising silicon and nitrogen; providing a transistor gate structure on a side of the material comprising silicon and nitrogen that is opposed to the one side; and forming a pair of source/drain regions separated from one another by the channel region.

For example, Chau (5,763,922) discloses a method of forming a transistor device where a silicon-comprising surface of silicon dioxide is exposed to activate nitrogen to convert the silicon-comprising surface to a material comprising silicon and nitrogen; the activated nitrogen being formed by exposing a nitrogen-containing precursor to a plasma maintained at a power of 500 watts to 2,000 watts; providing a channel region

on one side of the silicon and nitrogen surface; forming a plurality of PMOS or NMOS transistor gate structures on a side of the silicon and nitrogen surface opposed to the one side and forming a pair of source and drain regions separated from one another by the channel region.

Chau further discloses dividing the transistor gate structures into a first group and a second group and forming a mask over the second group during the exposure step. Chau also discloses the plasma as a remote relative to the silicon-comprising surface and the plasma contacting the silicon-comprising surface. Chau discloses implanting a dopant into the channel region with a concentration between $1x10^{16}$ atoms/cm^3 to $1x10^{17}$ atoms/cm^3. However, Chau does not disclose, anticipate, teach, or suggest exposing the substrate surface to activated nitrogen to increase a peak nitrogen concentration within the substrate surface by at least about 15 atom percent.

Buchannan et al. (6,566,281) disclose a method of forming a transistor device where a silicon-comprising surface is exposed to activate nitrogen to convert the silicon-comprising surface to a material comprising silicon and nitrogen (col. 7, lines 48-67). Buchannan et al. further disclose the activated nitrogen having a concentration of about 15 atomic % (col. 8, lines 1-10). However, Buchannan et al. do not disclose, aniticipate, teach or suggest exposing the substrate surface to activated nitrogen to increase a peak nitrogen concentration within the substrate surface by at least about 15 atom percent.

Yasuda et al. (6,756,635) disclose a method of forming a transistor device where a silicon-comprising surface of silicon dioxide (6) is exposed to activate nitrogen to

convert the silicon-comprising surface (6) to a material comprising silicon and nitrogen (11) (col. 7, lines 43-48), wherein the surface has a thickness of 1nm[1] (abstract). Yasuda et al. further disclose the activated nitrogen having a concentration of about 15 atomic % (col. 7, lines 43-51; col. 11, line 60 thru col. 12, line 8). However, Yasuda et al. do not qualify as prior art.

The prior art made of record in this action does not anticipate, teach, or suggest a method of forming a transistor device where a silicon-comprising surface is exposed to activated nitrogen to increase a peak nitrogen concentration within the silicon-comprising surface by at least 15% (atom percent), the exposing forming a material comprising silicon and nitrogen; providing a channel region on one side of the material comprising silicon and nitrogen; providing a transistor gate structure on a side of the material comprising silicon and nitrogen that is opposed to the one side; and forming a pair of source/drain regions separated from one another by the channel region.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Pamela E. Perkins whose telephone number is (571)

[1] 1 nm = 10 Å

272-1840. The examiner can normally be reached on Monday thru Friday, 9:00am to 5:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amir Zarabian can be reached on (571) 272-1852. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

PEP

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